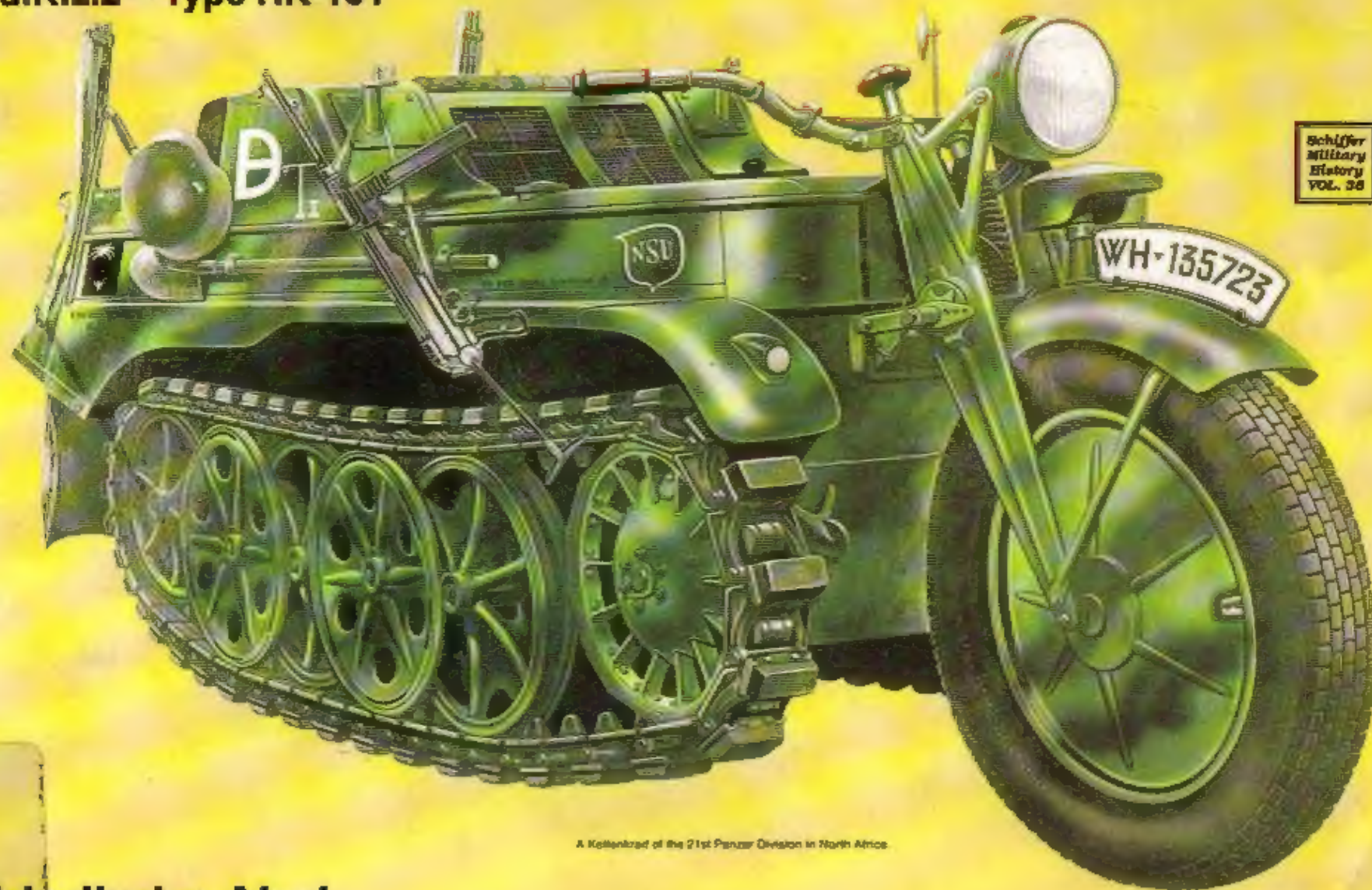


# THE KETTENKRAD

Sd.Kfz.2 – Type HK-101



Schiffer  
Military  
History  
VOL. 38

*A Kettenkrad of the 21st Panzer Division in North Africa*

Friedhelm Abel





Hand  
795

# THE KETTENKRAD

Sd.Kfz.2 – Type HK-101

Friedhelm Abel

ter 1943/44 in Russia. The side rails on the  
enger compartment, which were usually open, have  
covered by metal panels.(BA)

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**Photo Sources:**  
Bundesarchiv Koblenz (BA)  
Rolf Bocksberger  
Rainer Bischofing  
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Wehrmacht Manual D 624/1

Translated from the German by David Johnston.

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The first published photograph of the Kettenkrafad, released in the summer of 1942.



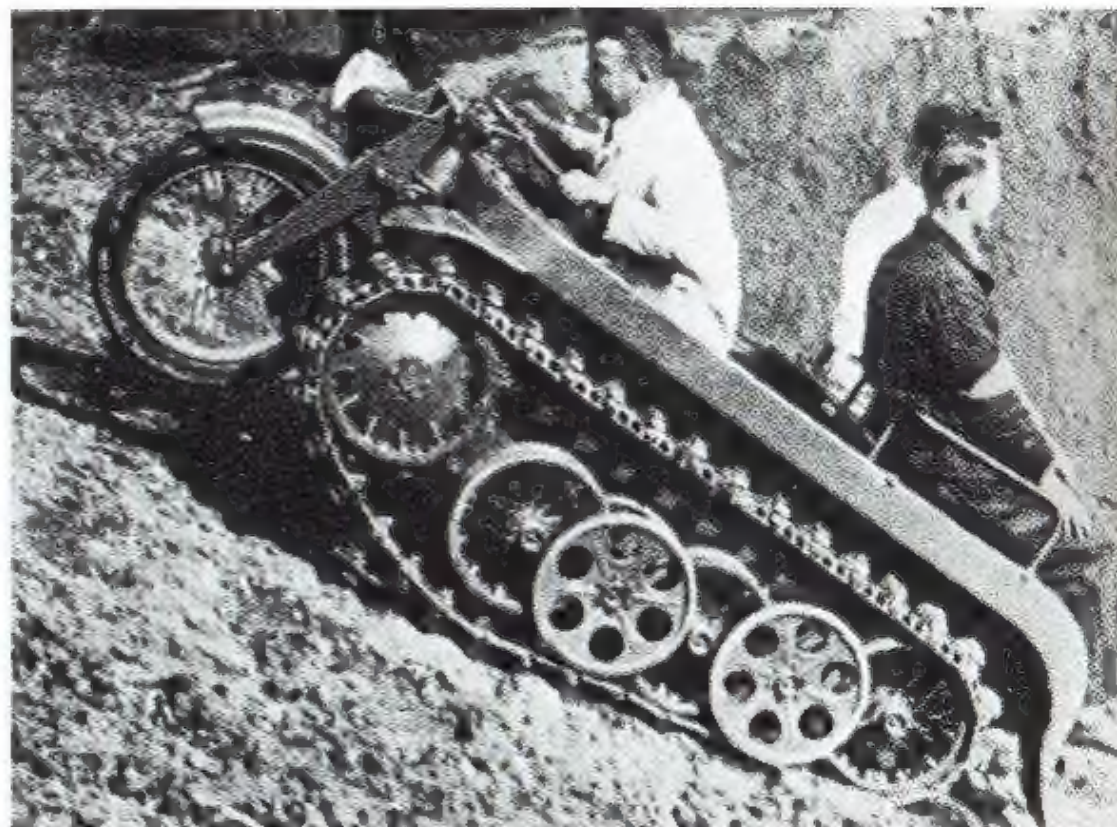
# The Kleines Kettenkraftrad (Kettenkrad) Type 101 - Sd.Kfz.2

In 1940 NSU in Neckarsulm was commissioned to construct a 0.5-ton tractor for use not yet able to deviate from the principle of a steerable front axle, it was — like its larger brothers — a half-track vehicle, but one with a motorcycle fork which performed the steering function on roads.

It was probably because of the use of this and other motorcycle parts that the new vehicle received the designation (also in official use) of Kettenkraftrad, or "Kettenkrad", (Tracked Motorcycle), although it had nothing whatsoever to do with the function and duties of a motorcycle. This was probably the origin of the widely-held view that the vehicle was used as a motorcycle and saw service primarily with motorcycle units. All of this is untrue — it was designed as a light tractor and was for the most part used as one by many different units and branches of the armed services.

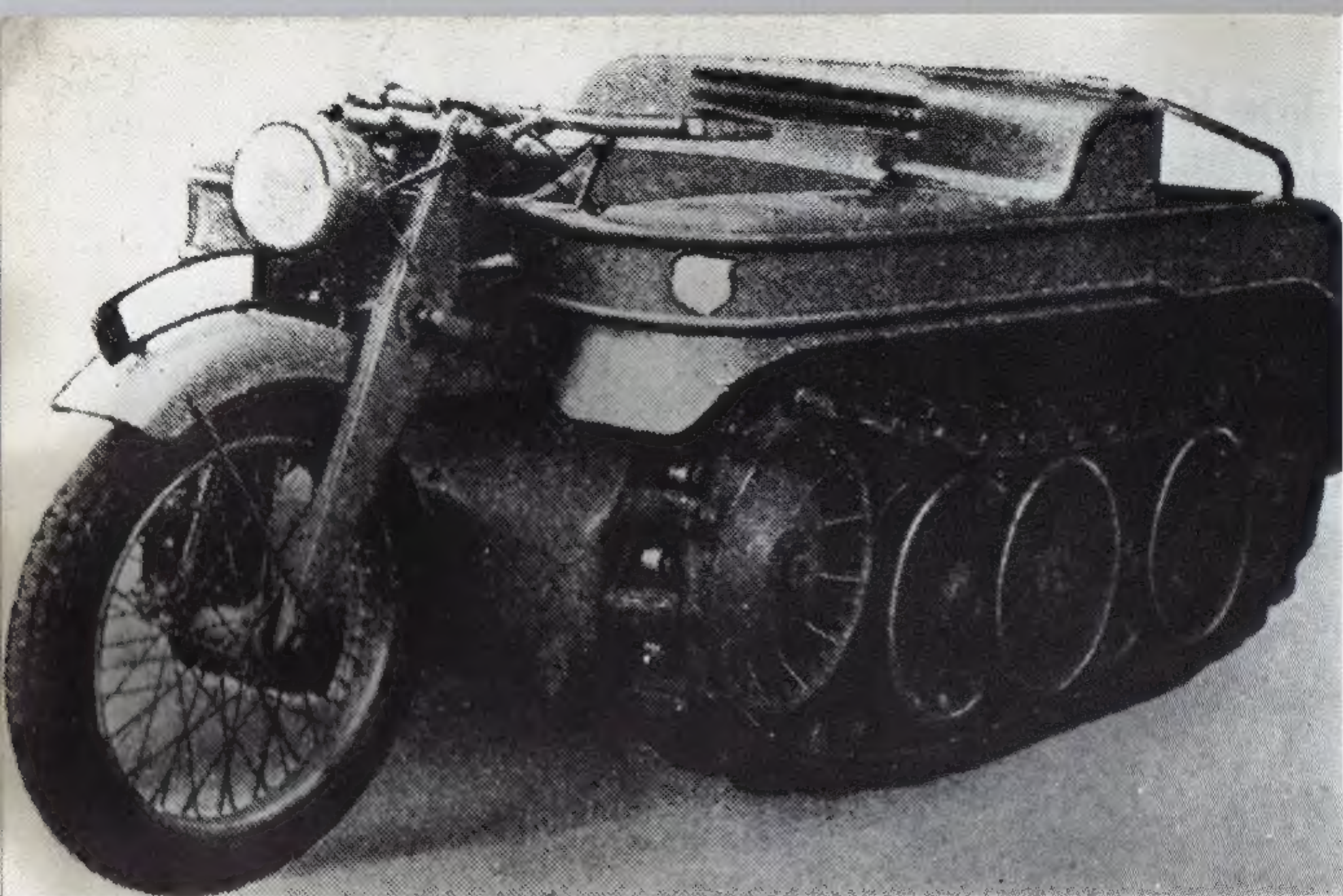
Two special versions were built:

- Sd.Kfz. 2/1 The kleine Kettenkrad for laying field communications cable and,
- Sd.Kfz. 2/2 The kleine Kettenkrad for laying heavy field communications cable.



A prototype — recognizable by the spoked wheel.





An even earlier prototype (probably from 1940) as, not only are the front wheel and the load-bearing wheels spoked, but the roadwheels as well.



## Development

In building the first prototypes the NSU Works used existing motorcycle parts such as the front fork, headlight, wheels, handlebars and instruments. The standard fork of the NSU 600-cm<sup>3</sup> machine soon proved to be too weak, however. When crossing ditches and ruts the fork, which had been designed for use on a standard motorcycle, simply broke. A modified, reinforced version was substituted, but this, too, proved rather prone to failure.

The first 70 Kettenkräder were delivered to the units in 1940. These were from a test series intended for service trials. In addition to the small fork, identifying features of the pre-production series were the lack of mudguards on the rear passenger area, high placement of the tow hooks, eight-spoked idler and roadwheels, transmission and fan housing of cast aluminum and the high, angular shape of the rear air vent housing.

The Kettenkrad was delivered with the relatively weak front fork until the end of 1942, the unavoidable consequence of which was frequent repairs. Later the entire unit was replaced by a new fork with an hydraulic shock absorber. All subsequent structural changes were the result of efforts to save materials and improve safety. The great affection the troops felt for the Kettenkrad was due in large part to its extraordinary usefulness, even in the most difficult terrain.

Right: This Kettenkrad already has the reinforced front fork. It is of special interest, however, because of the side-mounted cooling grill, which was later deleted.







It was, for example, capable of climbing a 45 degree grade and wading to a maximum depth of 44 centimeters of water. In addition to this the vehicle was very fast and maneuverable. On normal roads it could reach a maximum speed of 70 kph.

The machine did have several weaknesses, however, which could not be overcome during the course of the war: NSU was unable, for example, to completely seal the steering mechanism. The unavoidable result was the oiling of the steering brakes, whose drums were located right beside the steering mechanism housing. It was not uncommon for the steering system to fail within a few months of delivery. The designers must have been aware of this from the beginning, because they fitted both steering brakes with small drain pipes to cope with the eventual leakage of oil.

Another weak point was the gearwheel for reverse gear, which was of insufficient strength. Under extreme pressure it could occur that the aluminum transmission housing would break which, naturally, would damage other parts. The very complicated steering mechanism was essentially similar to those of larger tractors. The dis-

Left: This Kettenrad belongs to the pre-production series and has a civilian registration number. Here it is being tested by the director of the NSU Works in Neckarsulm, von Falkenhayn.



advantage of such complexity was that the failure of one component, a jammed gear in the reduction drive for example, would result in the destruction of quite a large number of gears and shafts. This is a problem that the few Kettenkrad owners of today still have to contend with.

It is interesting to note that copied parts manufactured today from the best gear steel hold up in the most extreme situations, sure proof that many defects and breakdowns during the war years could be traced to the inadequate supply of high-quality materials.

In the last two years of the war NSU designers were occupied with two further variants of the vehicle. One was a five-seat Kettenkrad powered by an Opel six-cylinder engine. About ten prototypes were built. The second variant was a wider, radio-controlled vehicle which could carry an explosive charge. The vehicle, which dispensed with the front fork, bore the designation "*Mittlerer Sprengladungsträger Springer*." Somewhat more than 50 examples were built. Due to the intensive bombing of German industry only three vehicles reached the front.



These photos also show Kettenkräder of the pre-production series under test. Driving parallel to a slope was a dangerous maneuver on account of the vehicle's narrow design and high center of gravity. Not only the Army, but the Luftwaffe as well, was interested in the vehicle.







Above: This well-known photo, which has appeared with various captions and dates, was taken during service trials at a German training grounds. This is the same photograph which appeared on the title page of the *Berliner Illustrierte* (30 July 1942) reproduced on Page 2. It can be seen above that the vehicle is pulling a trailer.

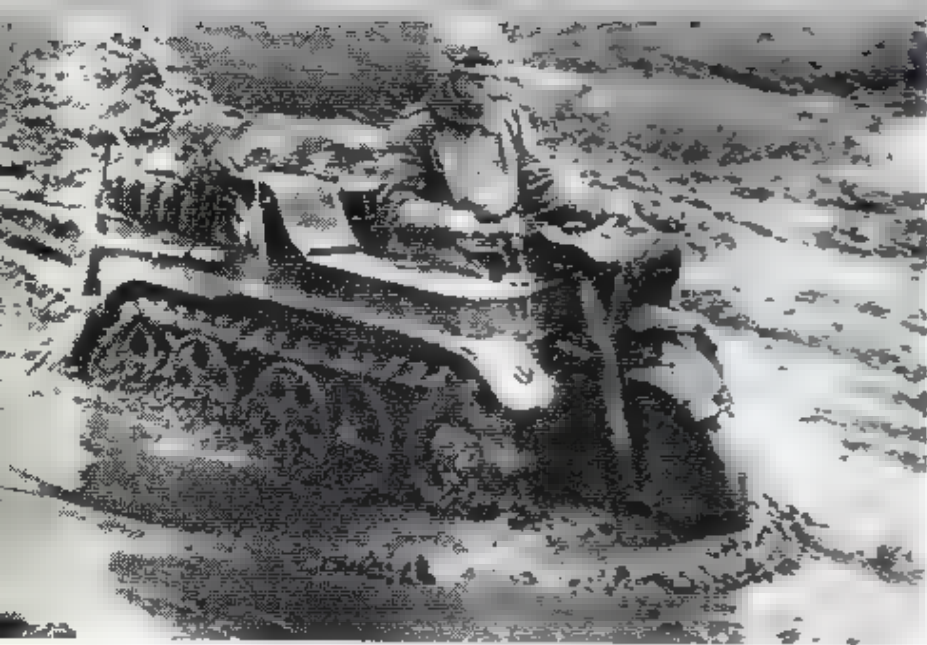
Left: A very interesting photograph: it shows a five-seat Kettenkrad, distinguishable its the three outer roadwheels. The normal Kettenkrad had only two. Only prototypes of this version were built. It was powered by a 75 h.p. Opel Kapitän six-cylinder engine.



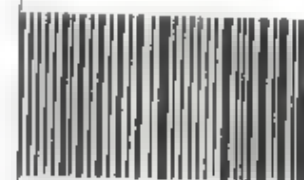


This NSU factory photograph shows a Kettenkrad of the first series with the trailer designed for this vehicle. The trailer was amphibious.





The first Kettenkräder reached the Eastern Front in the winter of 1942-43, where they immediately had to face difficult terrain and cold weather. Apart from the problem of the weak front fork they proved a success.

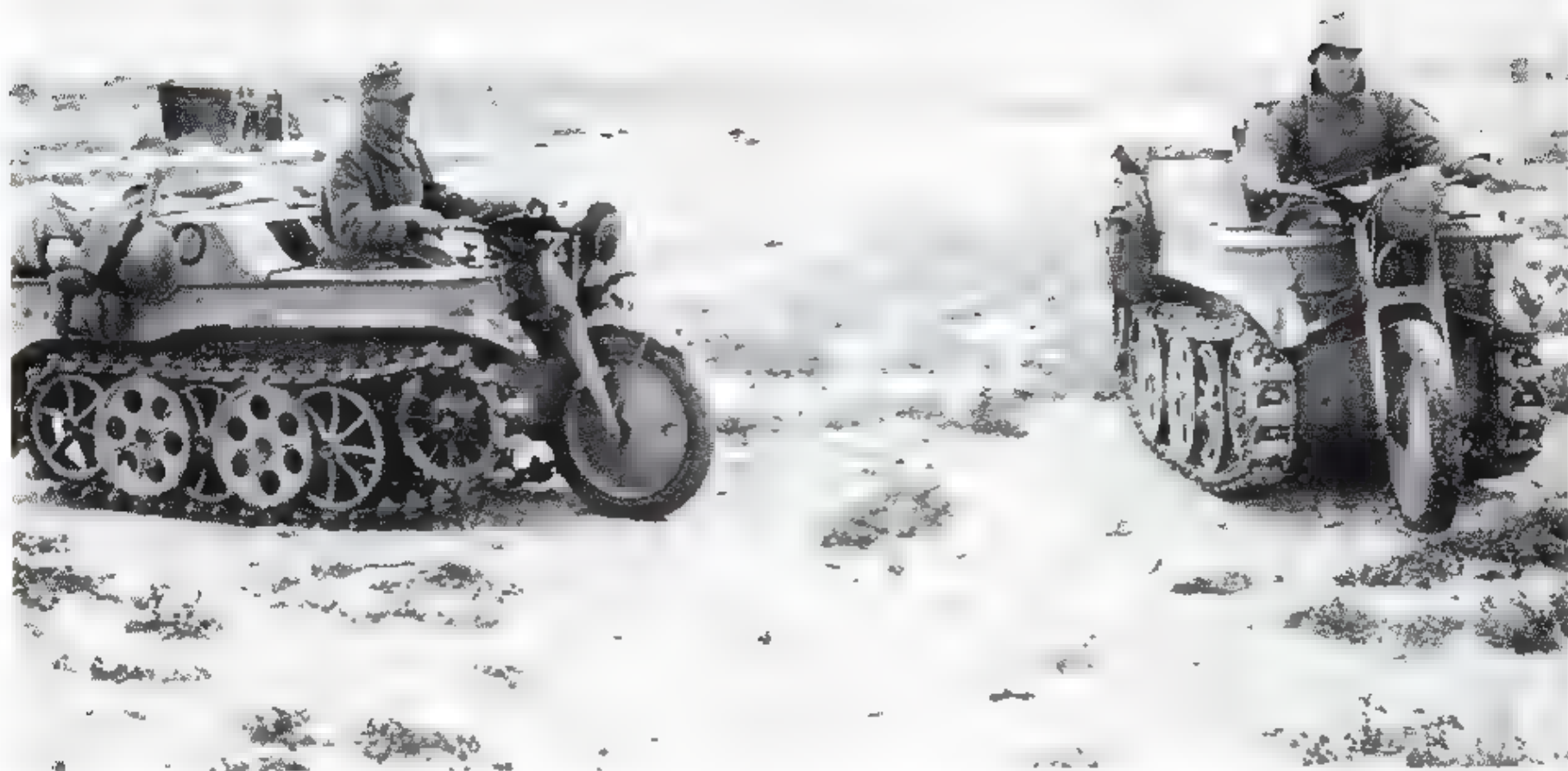


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Kettenkräder of the pre-production series also went to the front. They are recognizable by the eight spokes (instead of six on the later series) of the forward load-bearing wheel. These can be seen in previous photographs and the two at the top of this page.



# The Kettenkrad in North Africa



The Kettenkrad began to arrive in North Africa at about the same time as the Eastern Front. Here are two machines of the **Hermann Göring** Division, recognizable by the division emblem (a circle) on the side of the engine compartment, and the WL in the registration number. These two Kräder also have the eight-spoke load-bearing wheels, which suggests that they are pre-production vehicles being used in unit trials.





Above are two Kettenkräder of the 5th Panzer Division (note the division emblem on the mudguard — above left — and on the side — here together with the tactical marking for motorcycle troops) Both vehicles are pulling the previously mentioned trailers and have superstructures similar to those for the laying of field communications cable (Sd Kfz 2 1)



Left a photograph from Tunisia. Noteworthy are the side-mounted water canisters. All Kettenkräder used in North Africa were equipped with a multi-speed fan-ventilator for improved cooling.





A Kettenkrad of the *Fallschirmjäger Lehr-Brigade* which was sent to North Africa in 1942. The 'R' on the vehicle's side stands for *Generalmajor Ramcke*, the brigade's commander (BA)





It was quickly realized that the Kettenkrad was virtually ideal for the laying of field cable

Above. Laying light field cable and, right, a Kettenkrad with the special superstructure (Sd Kfz 2/2) for laying heavy field cable (BA)

This version is seen in action on the facing page. The trailer serves to transport additional drums of cable. Three soldiers, the heavy drums of cable and the trailer were about the limit for this vehicle. This Kettenkrad also has the eight spoke load-bearing wheel (BA)









## Engineering

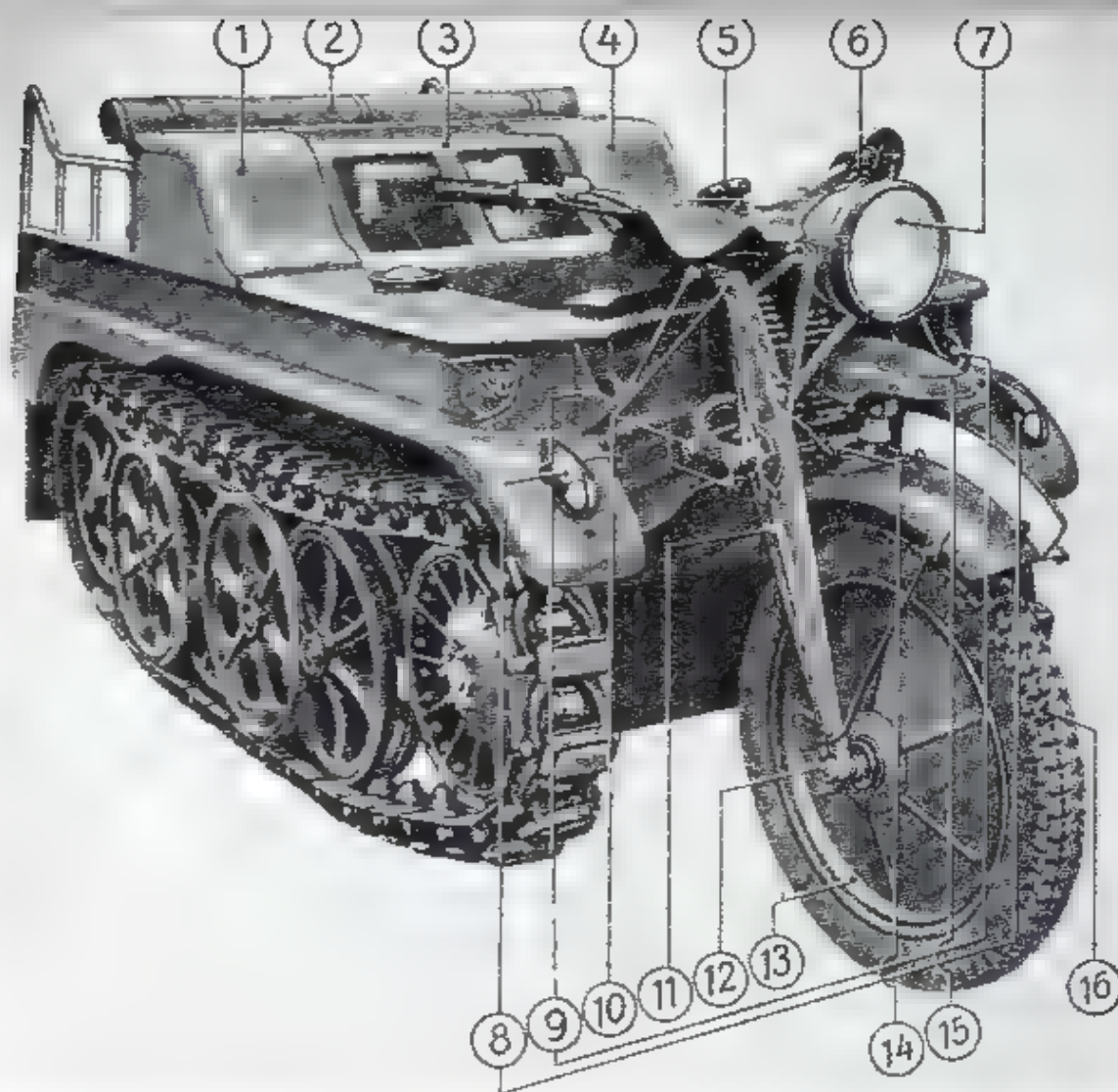
There were few significant changes in the engineering of the Kettenrad from the first prototype, with the exception of the strengthening of the transmission housing.

The Kettenrad was powered by a 36 h.p. Opel engine. The four-stroke engine had already been proven in the Opel Olympia passenger automobile. It produced sufficient power to drive the 1.3-ton Kettenrad even in the most difficult terrain and was extremely reliable.

The engine's displacement was 1,478 cubic centimeters. Its maximum output of 36 h.p. was produced at 3,400 rpm. Fuel consumption per 100 kilometres was quoted as 16 liters on roads and up to 22 liters cross-country. Compared to contemporary vehicles of the same weight one can say that the fuel consumption of the Kettenrad was low. Accordingly, it was possible to minimize the size of the vehicle's two fuel tanks, each of which held 21 liters.

Compared to the engine, the transmission was relatively expensive. It had three forward gears and a reverse gear in both the on-road and off-road gear ranges. In the lowest off-road gear ratio it was possible to "creep" along at 1 to 2 kph while developing tremendous pulling power. There are rare photos of fully loaded Kettenkräder towing several loaded trailers. On roads the machine could reach 70 kph. Power transmission was provided by a standard Opel single-plate dry clutch. The steering mechanism necessary in a tracked vehicle (Cleveland tractor type) was a reduced scale version of the steering used in the larger tractors.

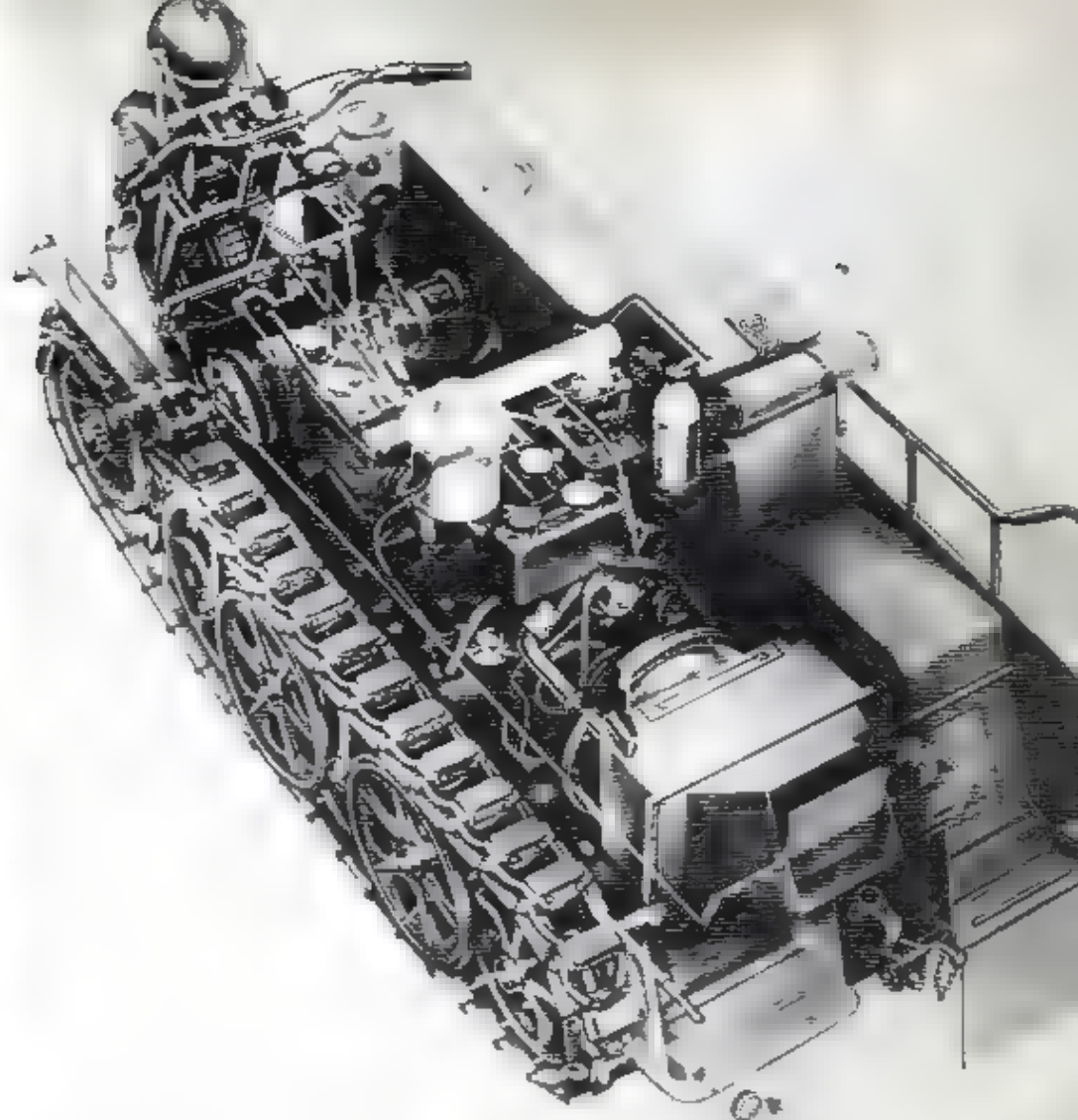
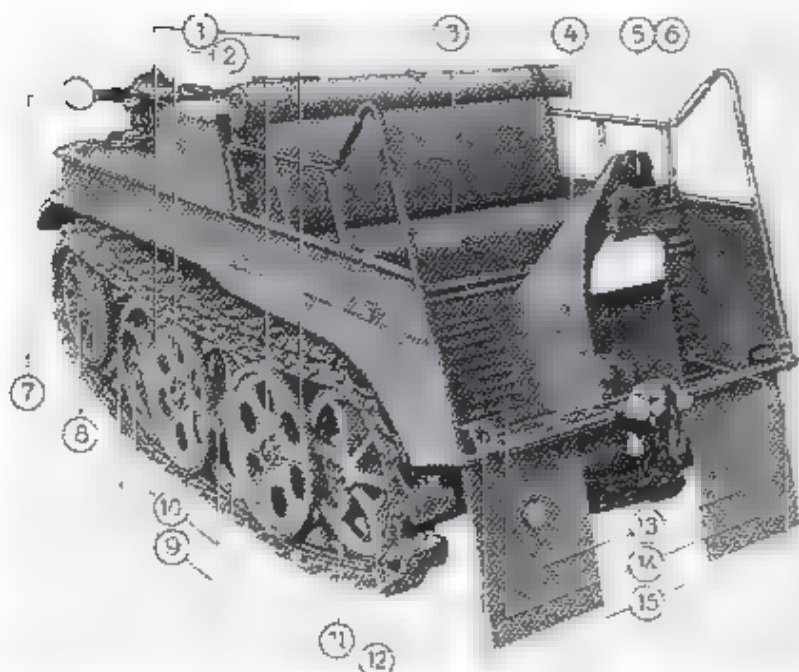
The steering mechanism was arranged square to the main shaft in the forward



Kleines Kettenrad

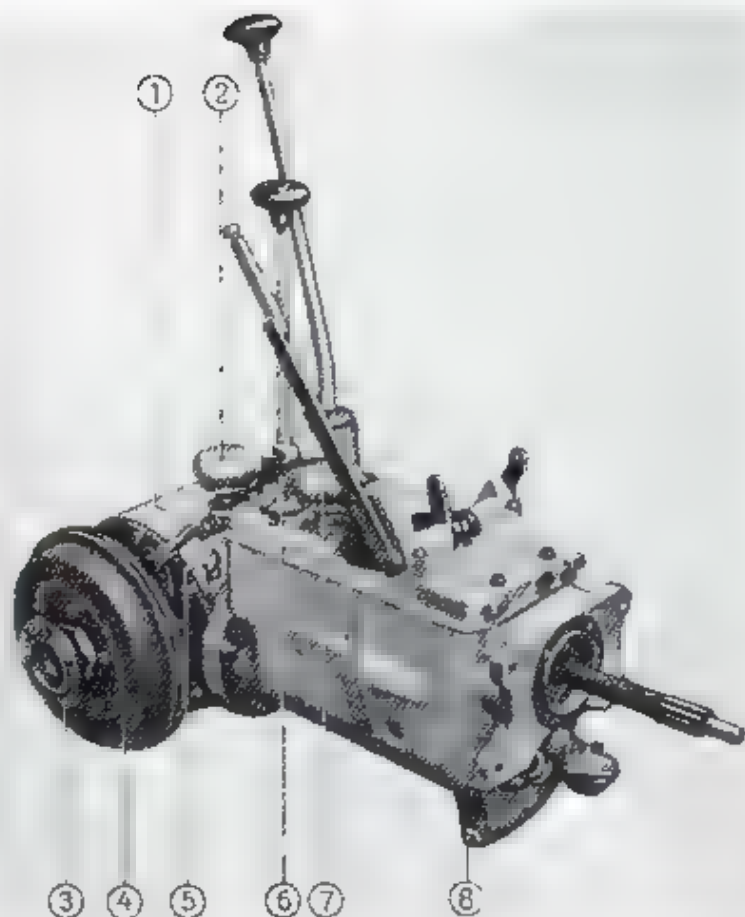
- |   |   |    |                                       |
|---|---|----|---------------------------------------|
| 1 | Compartment for battery, fuse box and accessories | 9  | Towing hooks                          |
| 2 | Canvas cover                                      | 10 | Spring-fork bolts                     |
| 3 | Engine housing                                    | 11 | Front fork                            |
| 4 | Compartment for accessories and documents         | 12 | Front axle                            |
| 5 | Control knob for steering damper                  | 13 | Front wheel                           |
| 6 | Headlight switch                                  | 14 | Spring-fork pressure lubrication pump |
| 7 | Headlight   | 15 | Blackout driving light                |
| 8 | Running lights                                    | 16 | Front tire                            |

- 1 Outer roadwheel
- 2 Pressure lubrication point for outer roadwheel
- 3 Rear seat with backrest
- 4 Trailer hitch
- 5 Socket for trailer tail light
- 6 Stop light and rear marker light
- 7 Rear view mirror
- 8 Drive sprocket
- 9 Inner roadwheel
- 10 Pressure lubrication point for inner roadwheel
- 11 Pressure lubrication point for idler wheel
- 12 Idler wheel
- 13 Mud guards
- 14 Movable rear wall
- 15 Tail light



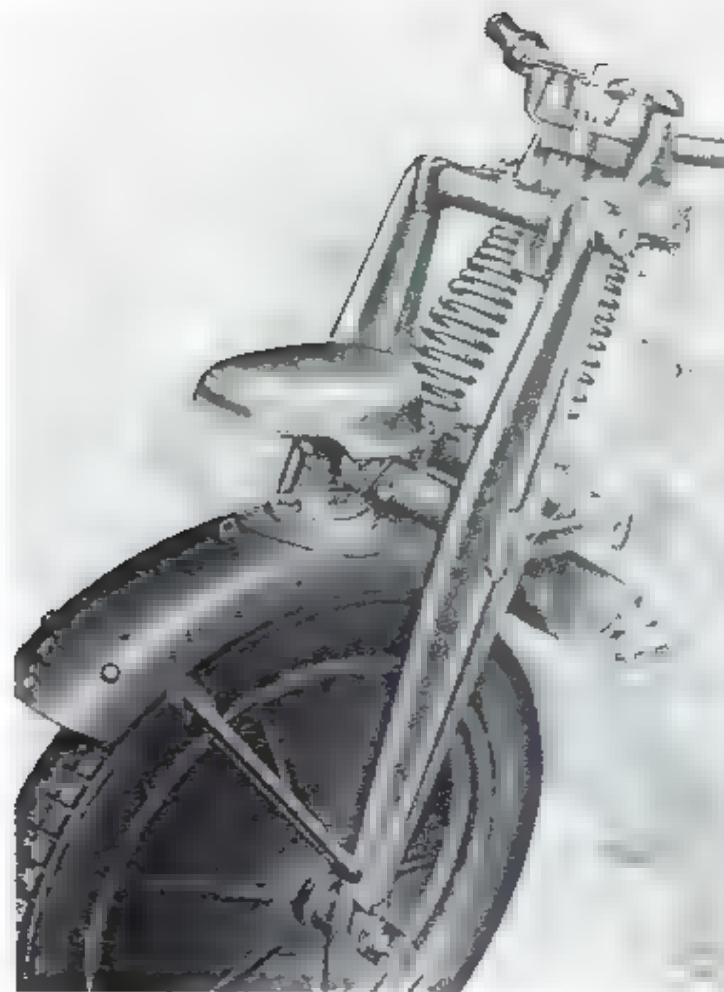
These illustrations, as well as those on the facing and following pages, are taken from Manual D 621 1  
 \* *Klein-nes Kettenkraftrad*, S Kfz 2 Type HK 101 Equipment Description and Operating Instructions.





**Gear Transmission and Auxiliary Transmission with Steering Mechanism and Steering Brake (left side)**

- 1 Operating lever for left steering brake
- 2 Steering brake tiller cap with ventilator
- 3 Left differential shaft
- 4 Left steering brake
- 5 Steering mechanism dipstick
- 6 Gear transmission tiller cap and dipstick
- 7 Transmission ventilator
- 8 Transmission oil drain plug



**Front Fork with Hydraulic Shock Absorber**

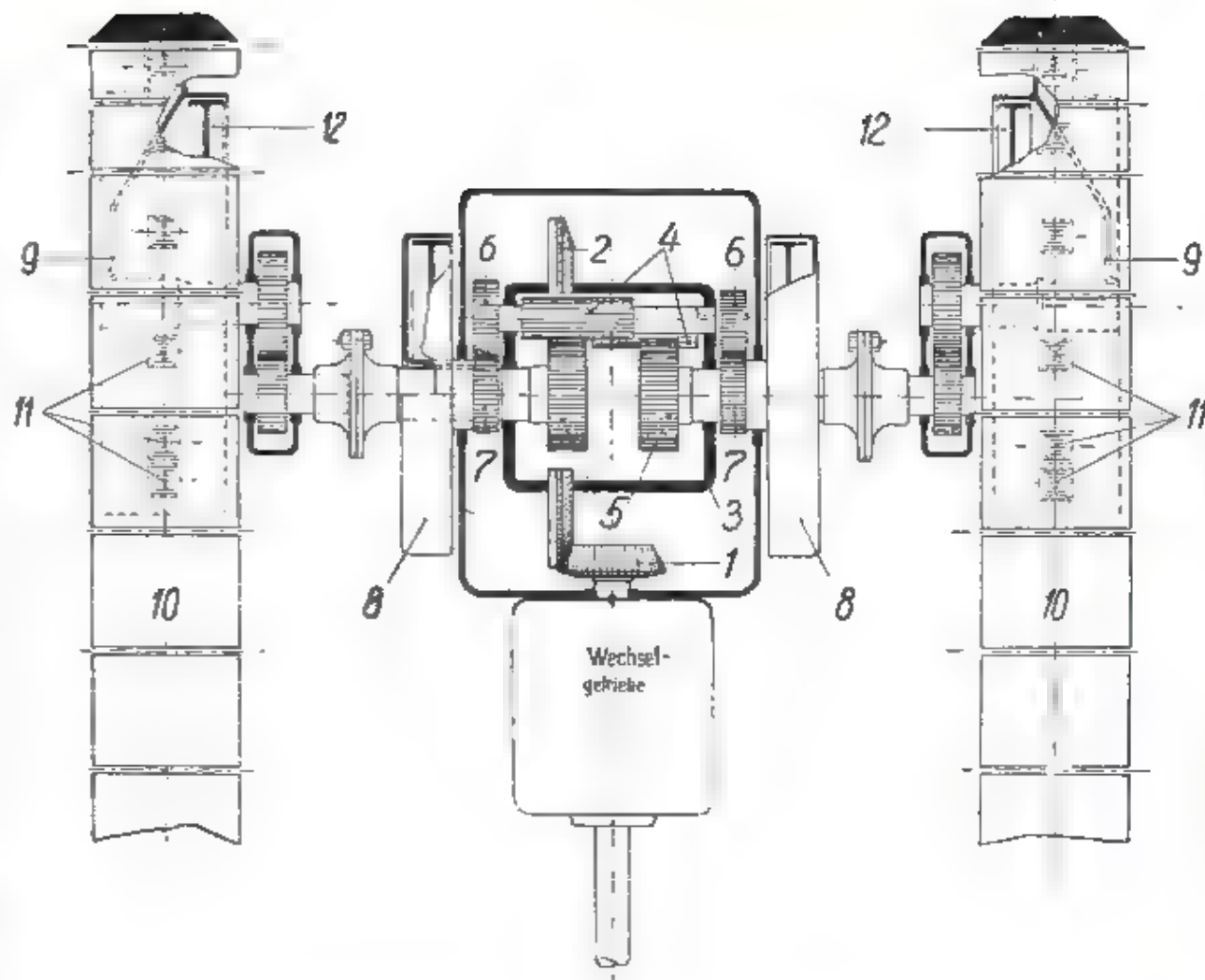
- 1 Hydraulic shock absorber
- 2 Butt strap, upper
- 3 Mounting angle for resistance on steering dampers
- 4 Bearing bolts
- 5 Butt strap, lower
- 6 Protective flap

footwell and was driven by a pair of bevel gears. It had a dual purpose: it acted as a differential and served to turn the vehicle, functioning as follows: by braking one drum, the rotation speed of the drive shaft on the same side of the vehicle was reduced and that on the opposite side increased proportionately. By varying the braking pressure, the turning radius could be increased or decreased. Locking one brake drum resulted in a turning radius of about four meters measured from the center of the vehicle.

The two caterpillar tracks each consisted of 40 links, which featured replaceable rubber blocks. During operations in winter some of the track links were fitted with snow cleats. The most expensive parts of the track were the needle bearings in the track links. They were sealed against dust and water and could withstand extreme mechanical loads. Especially worthy of mention is the vehicle's ground pressure. On firm ground it was approximately 3.75 kg per square centimeter. On soft or marshy ground, where the entire surface of the track made contact, the ground pressure was only 610 grams per square centimeter.

The running gear consisted of eight torsion bar suspended roadwheels, which bore almost the entire weight of the vehicle. It was an interleaved system with the roadwheels in a staggered arrangement. Both rear idler wheels and the drive sprockets could be equipped with ice breakers which prevented the accumulation of snow and ice between the tracks, idlers and drive sprockets.

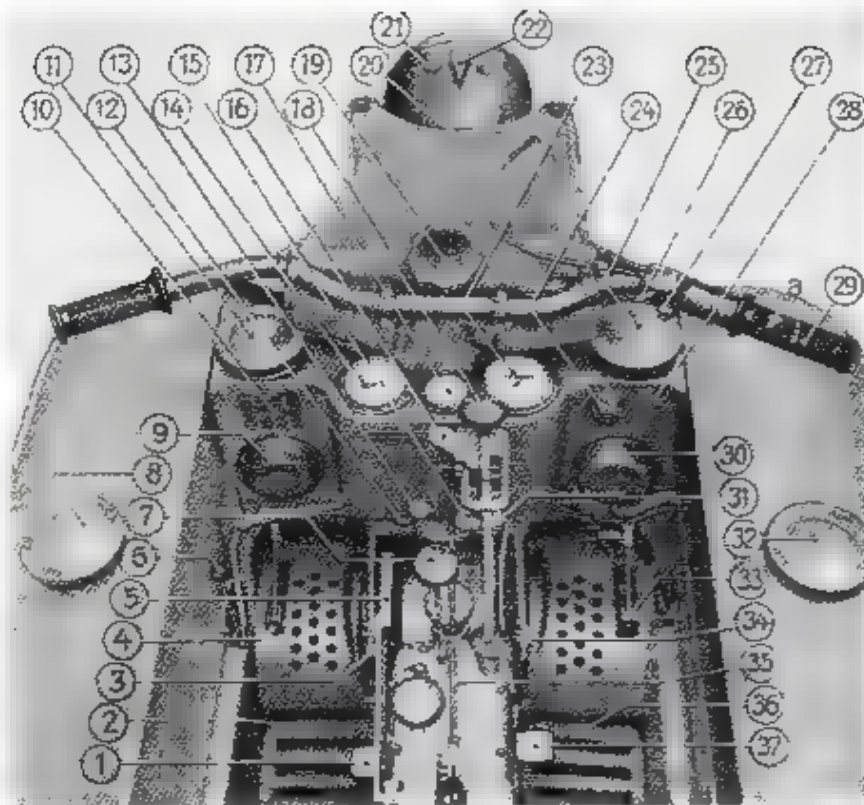
The chassis frame was self-bearing. The steering head for the front fork was welded to the forward upper part of the frame, with tow hooks installed to the left and right.



Steering Mechanism

- |                        |  |
|------------------------|--|
| 1 Bevel drive pinion   | 7 Brake drum pinion shaft                |
| 2 Large bevel gear     | 8 Steering brake drum                    |
| 3 Differential housing | 9 Drive sprockets                        |
| 4 Differential gears   | 10 Caterpillar tracks                    |
| 5 Spur gears           | 11 Carrier rollers for caterpillar track |
| 6 Outer gears          | 12 Wheel brake                           |





Plan View of Steering Mechanism, Control Levers and Instruments  
Forward view from driver's seat)

- 1 Clutch pedal
- 2 Wooden grate footrest, left
- 3 Left steering brake adjusting nut
- 4 Brake lever and linkage for left wheel brake
- 5 Hand brake lever with push button
- 6 Hand lever for cooling louver
- 7 Control lever for auxiliary transmission
- 8 Filler cap for left fuel tank
- 9 Left knee pad
- 10 Gear-change diagram for gear and auxiliary transmissions
- 11 Commuter for first-aid kit
- 12 Starting mechanism pull knob
- 13 Starter push button
- 14 Tachometer
- 15 Socket for hand-held light
- 16 Gearshift lever guide with reverse gear stop
- 17 Coolant temperature gauge
- 18 Gearshift lever
- 19 Steering damper control knob

- 20 Main headlight
- 21 Battery indicator light
- 22 Main headlight switch
- 23 Speedometer
- 24 Multistage switch for night driving equipment
- 25 Right compartment for tool kit
- 26 Dimmer switch (in high-beam position)
- 27 Horn push button
- 28 Oil-pressure warning light
- 29 Accelerator control grip (a)
- 30 Right knee pad
- 31 Instruments light switch
- 32 Filler cap for right fuel tank
- 33 Brake lever and linkage for right wheel brake
- 34 Right steering brake adjusting nut
- 35 Wheel brake linkage
- 36 Wooden grate foot rest, right
- 37 Brake pedal

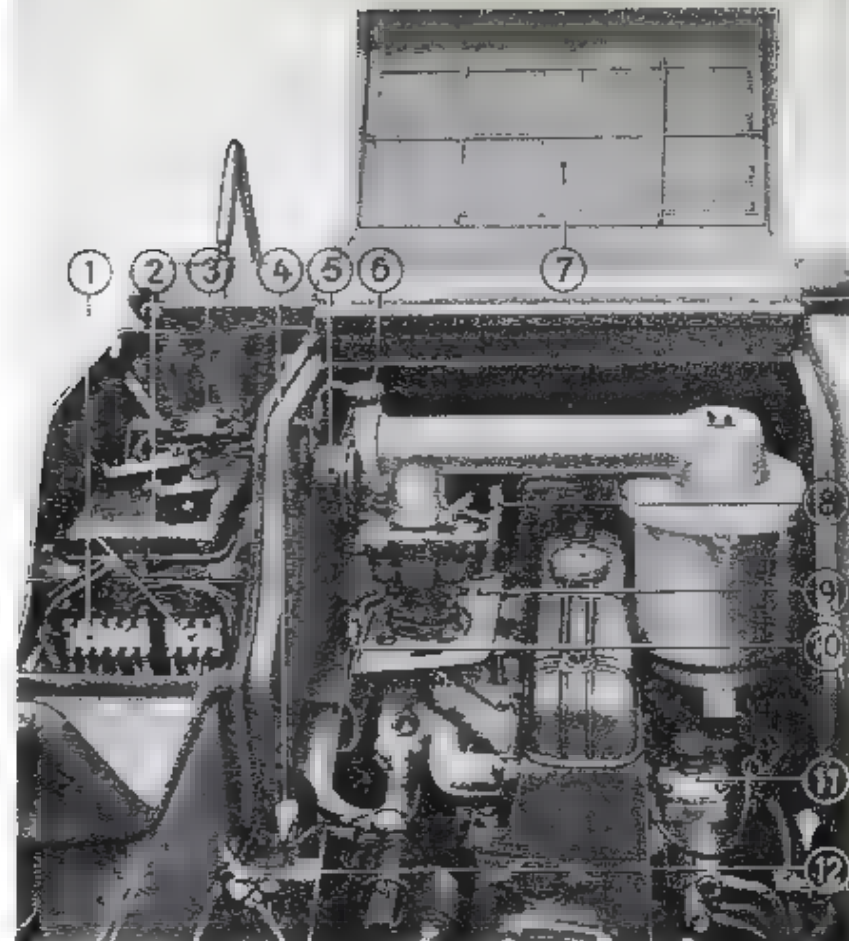
The steering brakes were activated as soon as the forks were deflected more than 5 cm to the left or right. The reasoning behind this arrangement was that gentle turns could be accomplished using only the front wheel. The steering brakes were engaged only in greater deflections.

In open terrain the Kettenkrad theoretically knew no limits. In first off-road gear the vehicle's climb angle was limited only by the courage of the driver.

Steering the Kettenkrad was not without its problems. As its center of gravity was relatively high and the vehicle quite narrow, there was a danger of tipping over in sloping positions. Also the operation of the individual gear shifting controls was not simple. The gearshift lever was situated between the driver's legs. Engine speed was controlled by a control grip. The clutch and brakes were operated by foot pedals as in an automobile. The transmission was not synchronized and demanded a "smooth touch" from the driver, who sat on a normal motorcycle saddle.



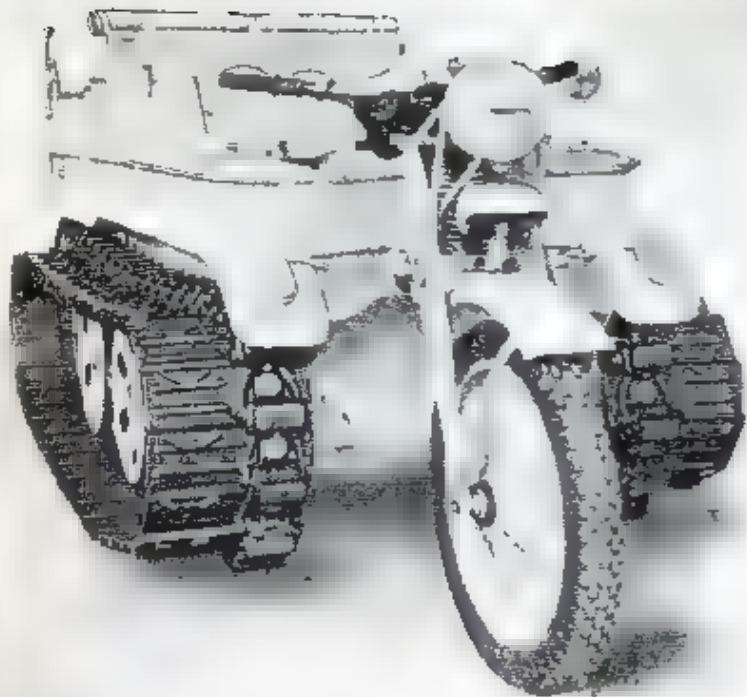
Turning on a slope



View from front, engine hood raised, battery, fuse and accessory compartments open

- 1 Fuses (box open)
- 2 Battery
- 3 Snow cleats
- 4 Engine hood latch, right
- 5 Horn
- 6 Oil bottle
- 7 Engine hood
- 8 Fuel line from fuel pump to carburettor
- 9 Carburettor drip pan
- 10 Throttle valve lever with linkage
- 11 Oil filter
- 12 Right fuel cock





Upper left. There were snow tracks for operation in deep snow with widening plates (the official designation). There were also smaller snow cleats for every fourth rubber block on the caterpillar track

Above: What now? It appears that Albert Speer, Reich Minister for Armaments and War Production, has overestimated the cross-country capabilities of the Kettenkrad somewhat

Left: A comparison with the photo above reveals another difference between early and late production models, namely, the installation of the forward tow hooks. On the early models they were installed on the right and left on a level with the blackout driving light (see photo left). On later versions they were on the lower hull, on a level with the drive sprocket axle (see photo above left)

# In Action

Driving on a muddy road (Russia 1944). In the background are three *Raupenschlepper Ost* (RSO) (BA)







Above left The usual photographic pose The submachine-guns at the ready suggest the enemy is near

Above A Kettenkrad with trailer during the spring muddy period — still in winter camouflage The stowed rifle (to the right of the soldier in the rear seat) suggest that the photograph was not taken close to the front

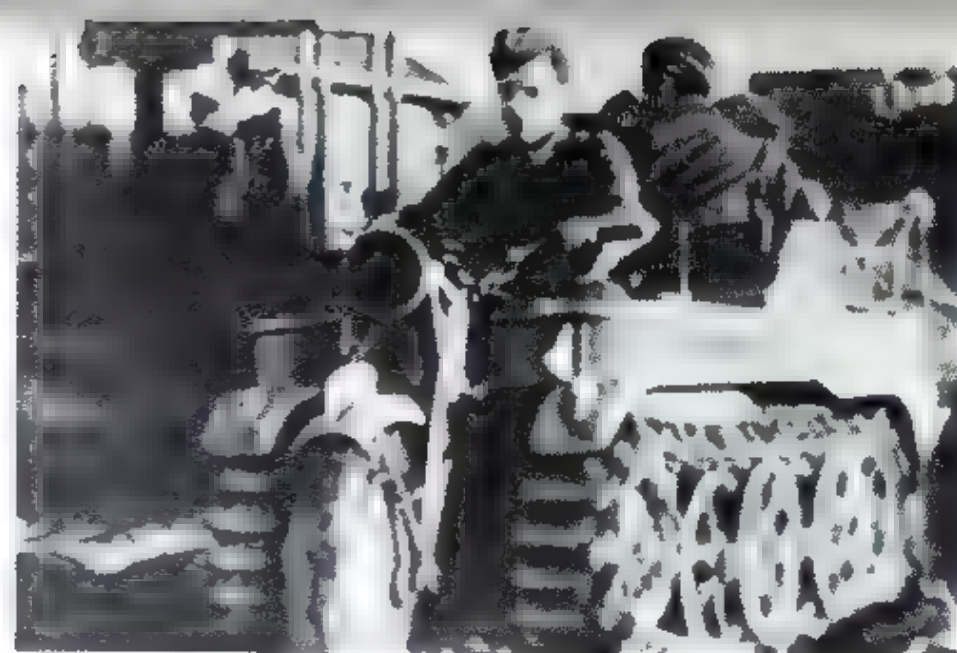
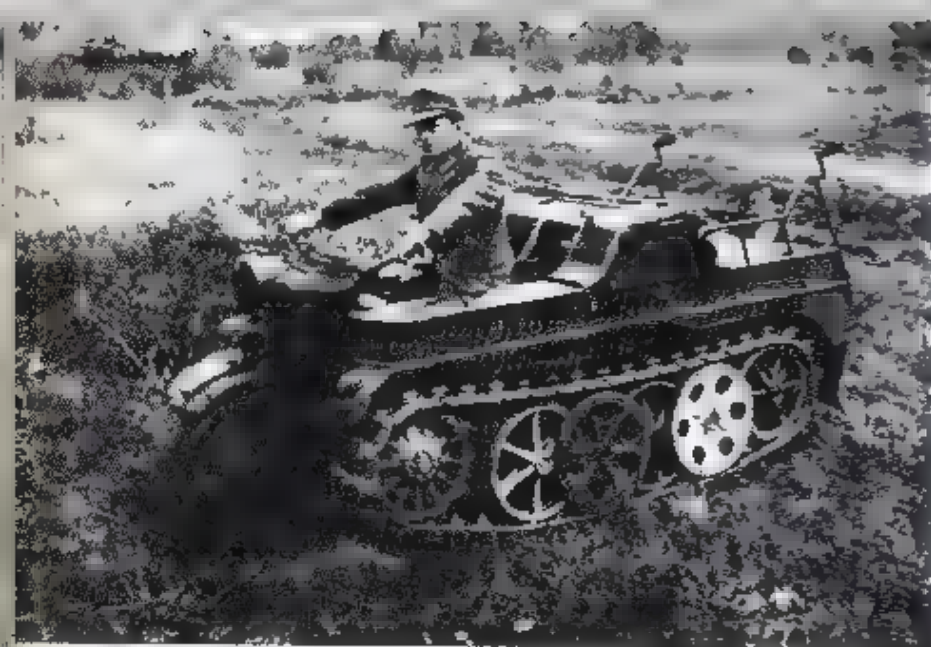


Left The Kettenkrad — here together with a Panther — was also used in Italy

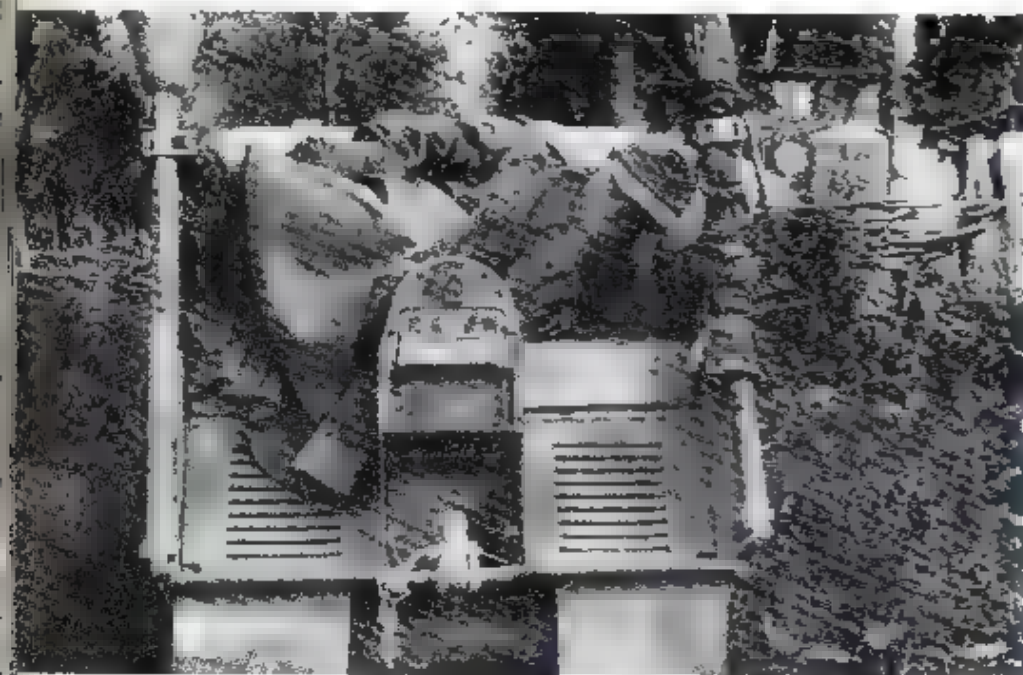


Five Kettentraktor fording a small stream





The photograph above left provides a good view of the rifle racks on the rear of the vehicle. As can be seen in the photo on the left, the racks could also hold the *Panzerfaust* anti-tank weapon. In the right rack on the same vehicle is a rifle with dust cover. This was surely an uncomfortable place to sleep, but youth and exhaustion didn't care.



The light color of the load-bearing wheel and outer roadwheel indicate that both have just been changed. This Kettenkrad has a Notek blackout driving light.







In this situation there was no going forward or backward — no Kettentraktor could get out of a situation like this without help

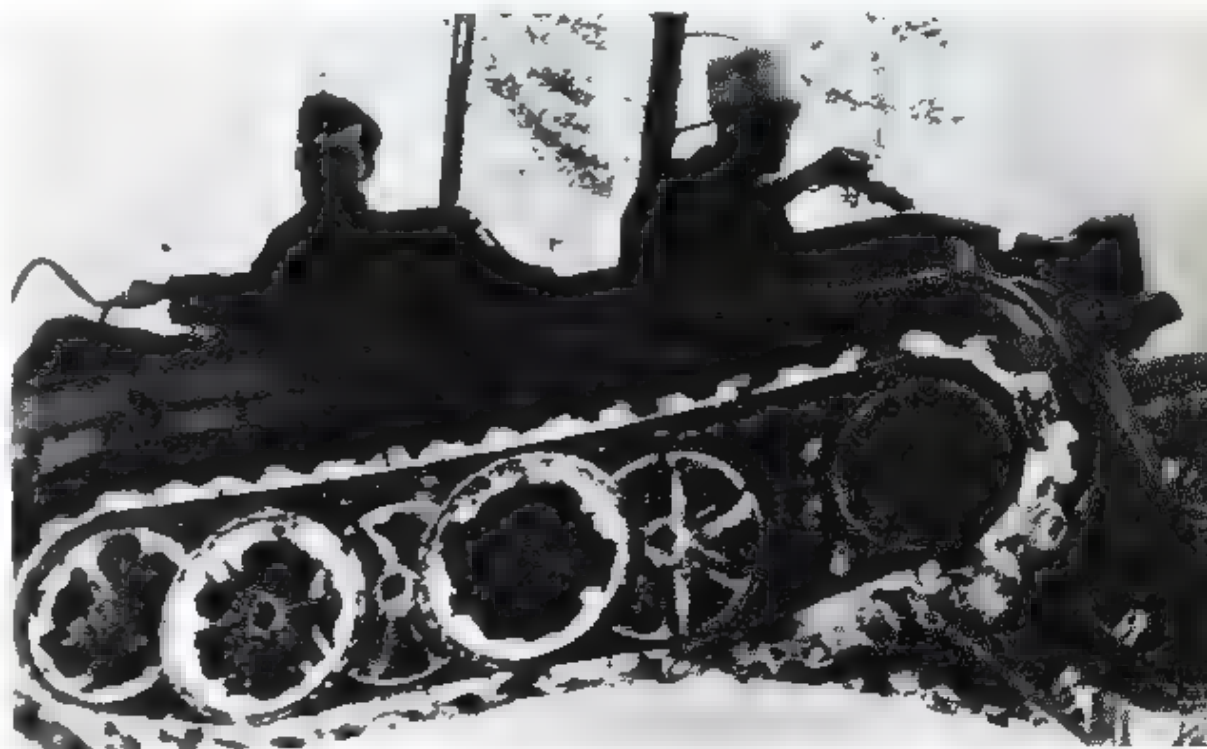


Winter and the muddy periods before and afterward placed great demands on the Kettenkräder, but also provided opportunities to demonstrate the vehicle's versatility. Equipped with snow cleats on every fourth rubber block or widening plates (less common) they could negotiate almost any type of difficult terrain.

Above: All three soldiers are wearing sentry coats. These had an inner lining of lamb's wool and were usually worn only by soldiers on guard duty.

Above right: Soldiers in standard-issue reversible winter parkas (field-gray on one side, white on the other). As this Kettenkrad has an eight-spoked load-bearing wheel, it is either an older model or has been fitted with an older replacement part during a repair.

Right: The Kettenkrad was also used in Finland.







The tractor in the foreground is a John Deere Model L, which was first introduced in 1958. It is a compact, utility-type tractor that has become one of the most popular models in the John Deere line. The tractor in the background is a John Deere Model S, which was first introduced in 1964. It is a larger, more powerful tractor that is designed for use in a variety of applications, including mowing, grading, and hauling. The John Deere company has a long history of producing high-quality, reliable tractors, and these two models are just two examples of the company's commitment to excellence.



Winter photos from taken from Karelia (right) to the Ukraine (above right). In the upper photo (Army Group North) the Kettenkrad is pulling a different type of trailer than the one usually seen

On the two vehicles in the photo above right the rails around the rear seat have been covered by metal panels. All Kettenkräder delivered from 1944 on had these panels and an even stronger front fork

On the right a Kettenkrad is seen hauling a tree trunk. The vehicle is heavily loaded to improve traction







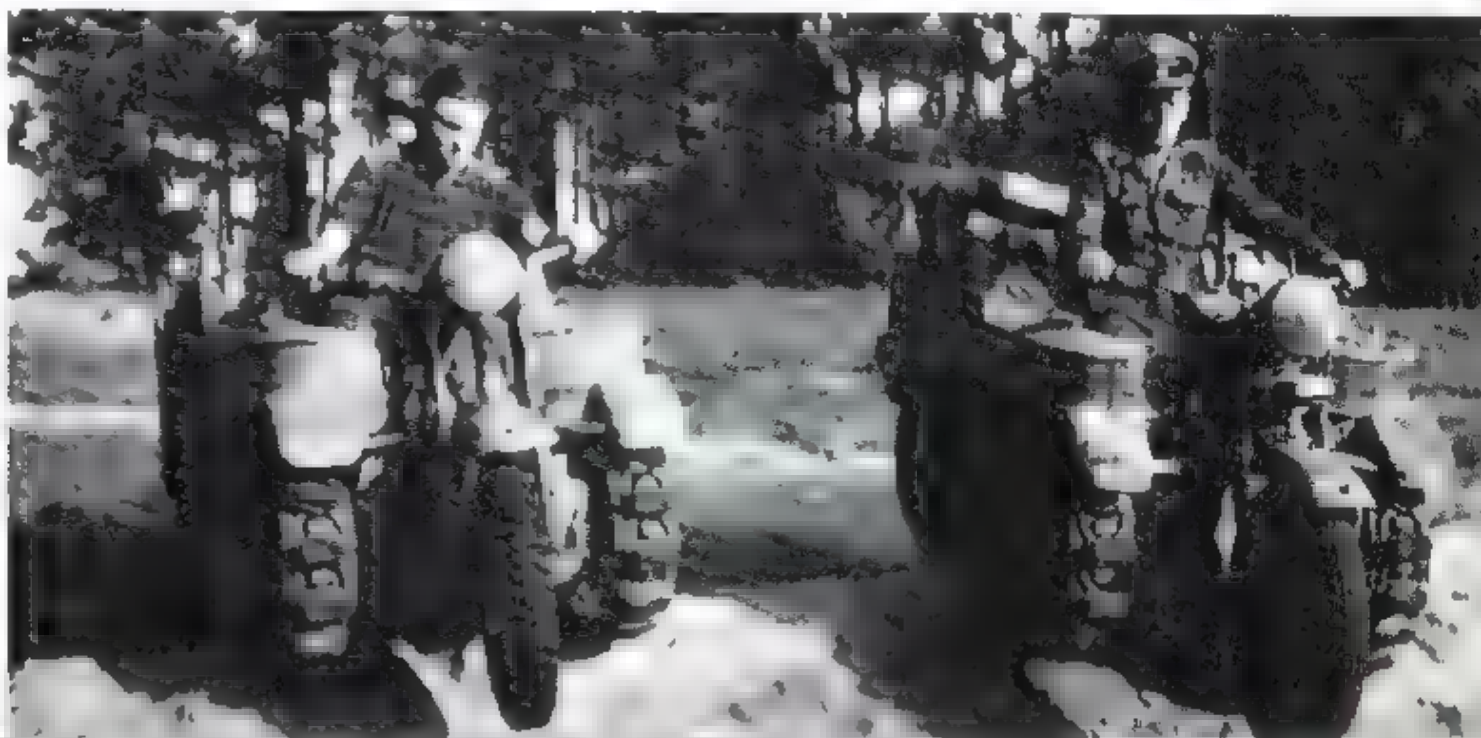
Above: The muddy period. The entire vehicle is covered with dark mud. The rolled-up tarpaulin over the centre section is interesting.

Left: A photo taken in the mountains of the Balkans (1943). The cramped posture of the driver suggests how difficult it could be to drive and steer the Kettenkrad which, in this case, is further complicated by the presence of a trailer (again a non-standard type).

1942 Mountain troops in the Caucasus. Here again a Kettenkrad is seen pulling a trailer. This photograph illustrates the role for which the vehicle was designed: a light tractor for transporting small loads in difficult terrain or over narrow roads. The Kettenkrad could be driven without the front fork, directions for this were contained in the operating manual.



Driving practice with the Waffen-SS







A Kettenkrad transport column. Included in the cargo are bales of hay.



Above: A rare combination - winter sports and a Kettenrad



Above right: Once again mountain troops in the Caucasus. The division emblem (Edelweiss) on the trailer identifies the vehicle as belonging to the 1st Gebirgsdivision

Right: A supply column in the southern sector of the Eastern Front







Above: Here a late-model Kettenrad tows an Me 262 jet fighter to the flight line. Relatively easy work

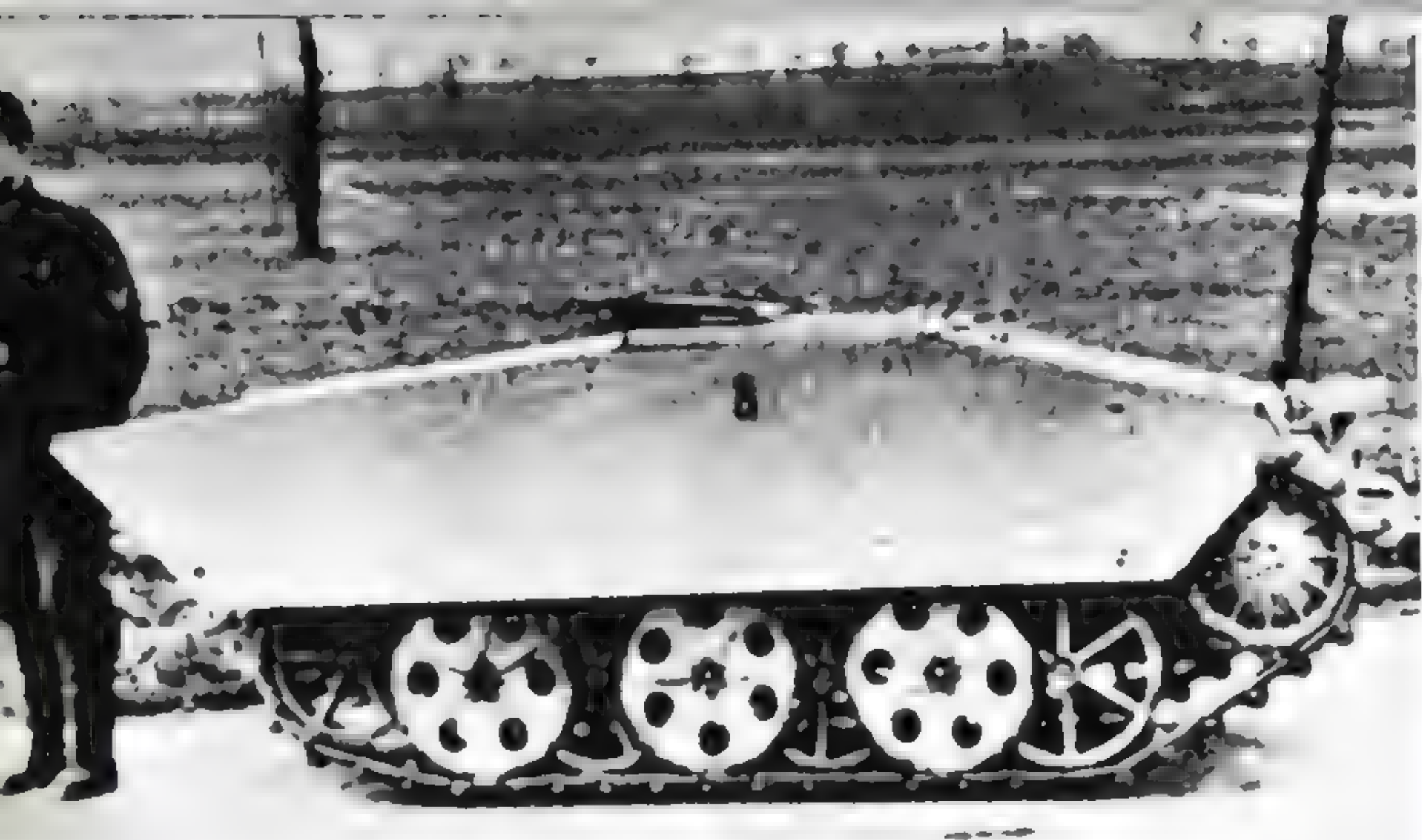
Left: In contrast, months of driving in the mud was a great burden on men and machines. All servicing and minor repairs had to be done by the driver himself

# Transports for Unit Commanders

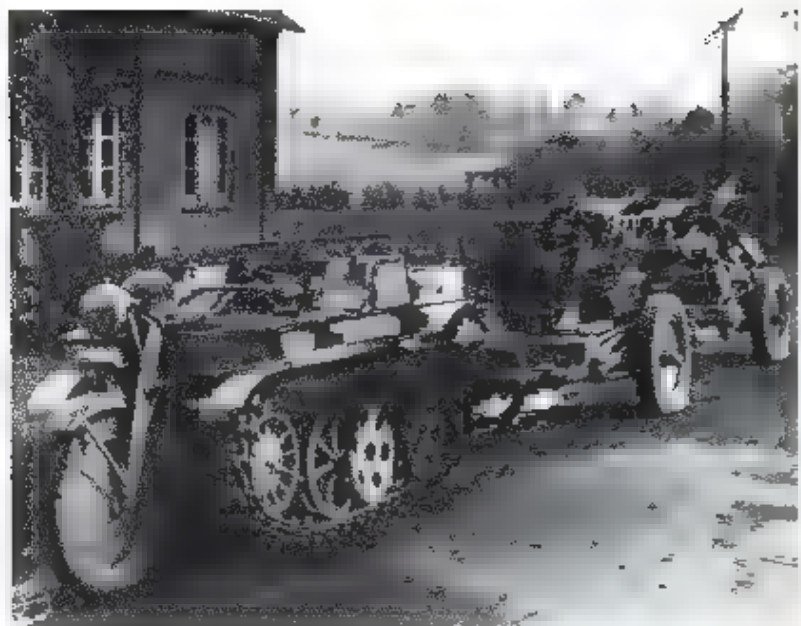


Here *Generalleutnant* von Manthey, commander of the 7th Panzer Division, drives to the front in the back seat of a Kettenkrad. Note the submachine gun, right, and rifle in the vehicle's side racks. This machine also has the metal panels over the rear seat side rails.





A comparison of the letters and the form features mentioned by the expert revealed a high degree of similarity and the following applies for changes of the words for each of the words: "recognizable"



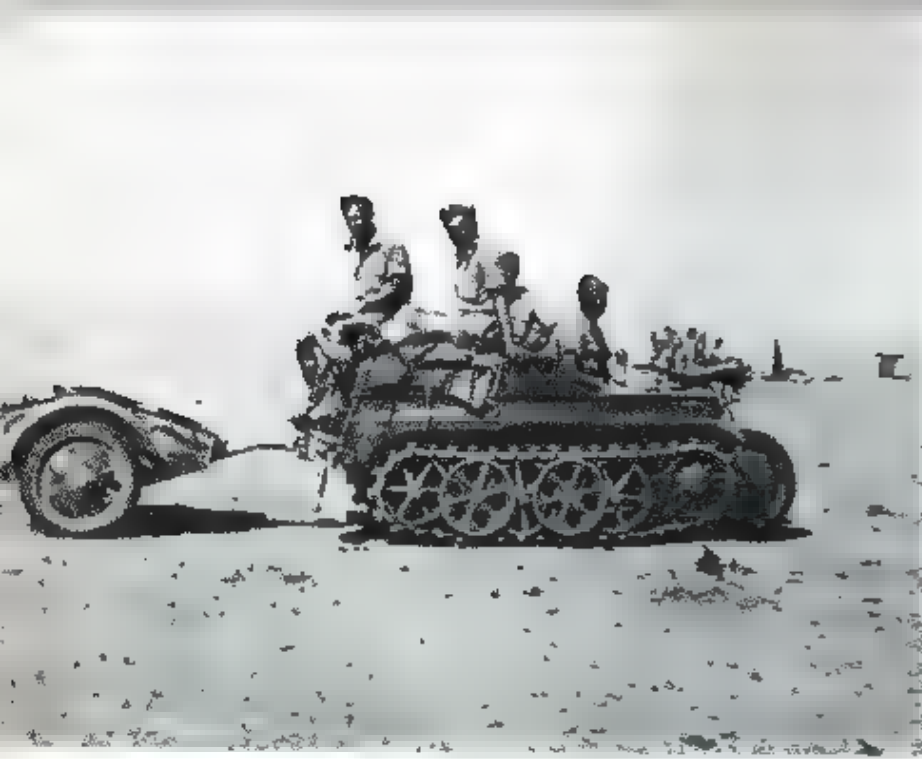
#### The end

Above. An abandoned, burned-out Kettenkrad with limbered 20mm Flak, probably the victim of a fighter-bomber attack. The photo was taken in early 1945 between Wippenfûrth and Marienheide in the Oberberg District

Right. After a bombing attack on Pont Abbé (northern France) A photograph of the horror of war



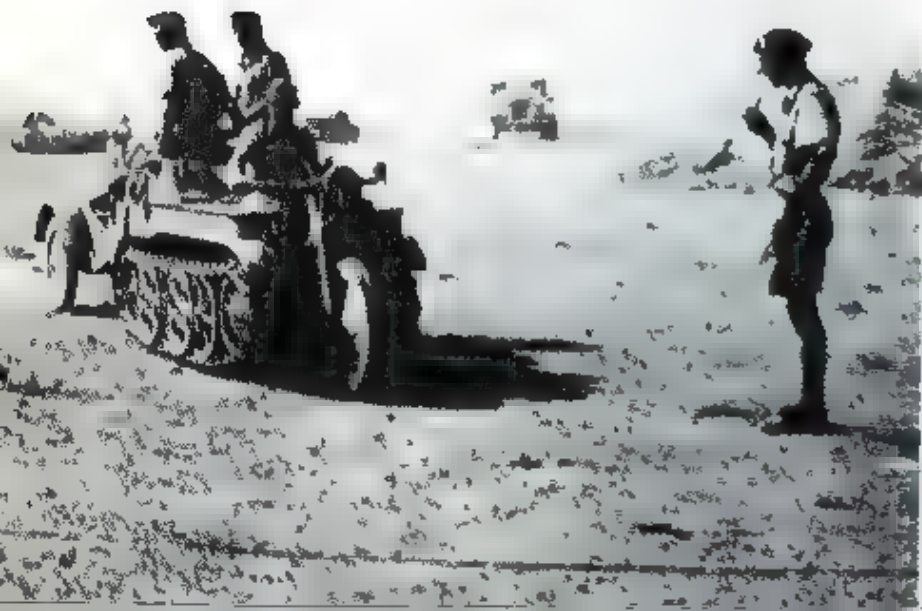




## In the Hands of the Enemy

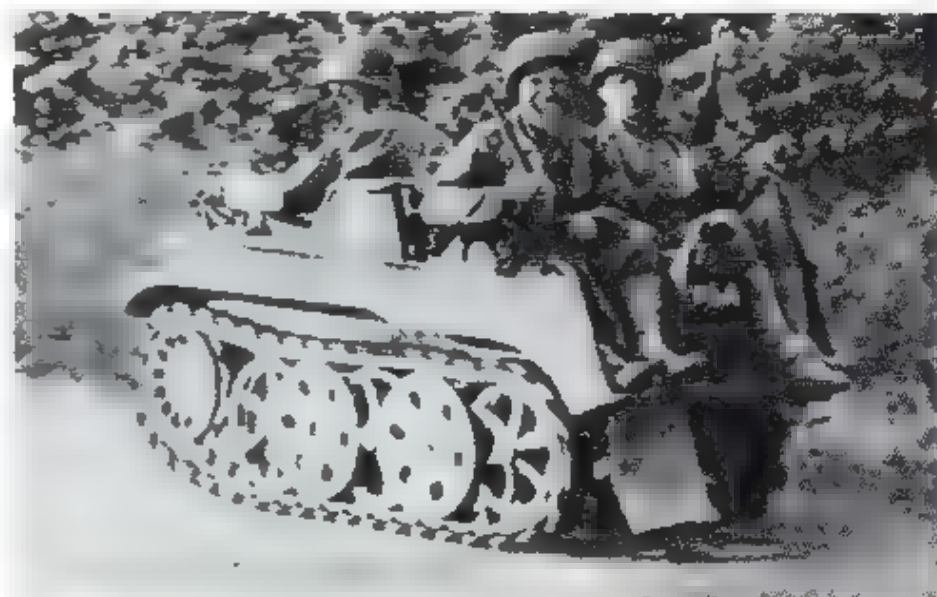
The Kettenkrad was also valued by the enemy. Here English troops drive around in Kettenkräder following the surrender of the German Army in Tunisia. The insignia of the *Afrika Korps* is plainly visible.

Facing page: A particularly good photograph of a Kettenkrad in the hands of the English still wearing the insignia of the 5th Panzer Division and the 3rd Squadron of *Kradschützen* Battalion 55.









#### In American hands

Above left: This Krad was captured and put to use by the U.S. 506th Parachute Regiment in Carentan (Invasion Front, northern France) in June 1944

Above: It is interesting to note the "USA" on the rear of the vehicle

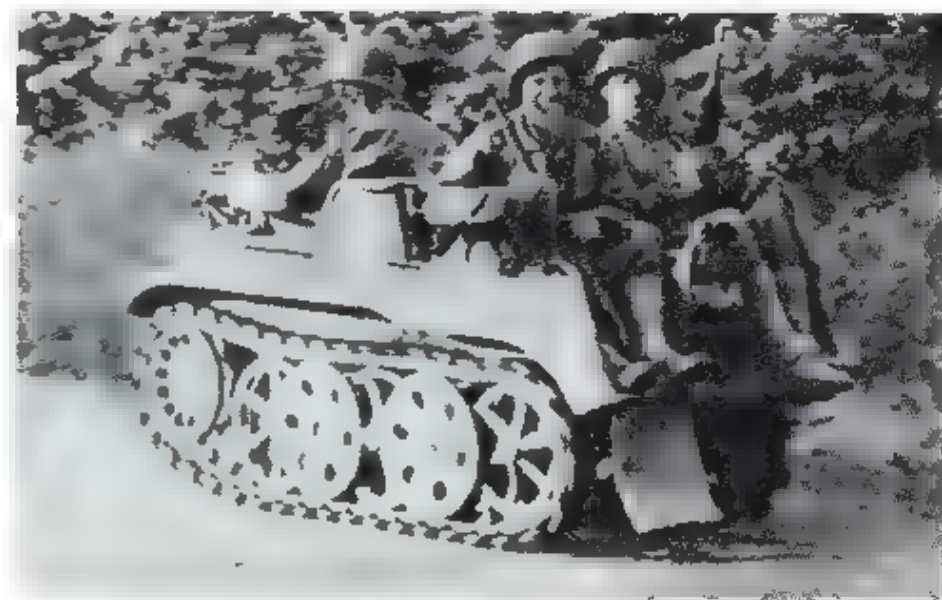
Left: In addition to the American national insignia (white star), this Kettenkrad bears the inscription "Military Police"

Facing page: This photo originates from the invasion front in northern France (June 1944)









#### In American hands

Above left. This Krad was captured and put to use by the U. S. 506th Parachute Regiment in Carentan (Invasion Front: northern France) in June 1944

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Left. In addition to the American national insignia (white star), this Kettenkrad bears the inscription "Military Police"

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## Epilogue

The Kettenkrad was one of the most remarkable vehicle designs of the Second World War and today is the subject of great interest among collectors and museum visitors. During the war a total of 8,345 examples were built.

It should be mentioned that production of the Kettenkrad continued in Neckarsulm for three years after the end of the war. These vehicles were used mainly by farmers, forestry departments and wine growers.

Also interesting is the fact that in the last forty years no manufacturer of off-road vehicles has succeeded in bringing an equally capable vehicle to the market. It can be said that to this point the off-road capabilities of the Kettenkrad have not yet been surpassed. In 1957 NSU built a so-called *Gebirgskarett* at the request of the Bundeswehr. This was a vehicle which externally and technically was very similar to the Kettenkrad. It was 1.25 meters wide and 3 meters long. This development dispensed with the front fork, and was powered by an air-cooled Porsche engine. Only three prototypes were built, which were apparently unsatisfactory. The project was shelved.

Photographs from museums and post-war employment.

Above: From Connors (USA). Of interest are the non-standard running lights. Below it is the Kettenkrad which is on display today in the Tank Museum of the Bundeswehr's *Kampftruppenschule 2* in Munster (Lüneburger Heide).

Above right: The running lights and rear-view mirror on this vehicle were installed after the war. Below is a well-preserved, but too brightly painted Kettenkrad.



# Technical Data:

## Performance of the Kleines Kettenkraftrad

Trailer load (normal weight)	450 kg
Speed on roads at 3,000 rpm	61.5 kph (normal)
Maximum speed	70 kph
Range with full tanks	250 km
Climbing ability in loose sand with trailer load	12 degrees
Climbing ability in loose sand without trailer load	24 degrees
Fuel consumption on roads	16 liters/100 km
Fuel consumption off-road	up to 22 liters/100 km

## Weights

Combat weight	1,560 kg
Net weight, ready for use	1,235 kg
Pay load, including driver	325 kg
Weight on front wheel, approx.	95 kg
Weight on tracks, approx.	1,465 kg
Specific ground pressure on firm ground (when only the rubber blocks are in contact with ground)	3.75 kg/cm <sup>2</sup>
Specific ground pressure on soft ground (when rubber blocks are pushed far enough into the ground to allow the entire surface of the track to be in contact)	0.61 kg/cm <sup>2</sup>

## Dimensions

Overall length	3,000 mm
Overall width	1,000 mm
Height	1,200 mm
Track width	816 mm
Steering angle	approx. 65 degrees
Smallest turning radius, measured from center of vehicle	approx. 4 m
Caster of front wheel	approx. 35 mm
Ground clearance	approx. 230 mm
Wading depth	approx. 440 mm

## Engine

Type	Opel 1.5 liter
Output at 3,400 rpm	36 h.p.
Number of cylinders	4
Bore	80 mm
Stroke	74 mm
Total volume of cylinder (piston displacement)	1,478 cm <sup>3</sup>
Firing order	1-3-4-2

## Mode of operation

Compression ratio	Four stroke
Valve play with warm engine:	1 : 6
Inlet	0.2 mm
Outlet	0.3 mm
Lubrication	Pressure lubrication by geared pump
Ignition	Battery ignition
Spark control	Automatic
Carburetor	Solex downdraft carburettor
Engine cooling	Water cooling
Water circulation	Pressure circulation - vane-type pump
Ventilator	Air compressor
Generator	Type "Bosch REDK 75/6 - 1600 AR 24"
Spark plugs	Type "14 DIN 72 502 Bosch W 225 T 1"
Starter	Type "Bosch EGD/06/6 R 1"
Battery	Type "6 X 75 Kr 2311" (KAW-Battery 3 Ad 75.6 Volt, 75 Amp)

## Transmission

Clutch	Single-plate dry clutch
Transmission and auxiliary transmission	Six-gear transmission
Steering and differential gear	Spur gear
Reduction gear with drive sprockets	

## Gear Ratio Table

	In Gear	Differential Gear	Reduction Drive	Overall Gear Ratio
On-road Gear Range	I 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	1 : 60.5 1 : 39.7
	III 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	2 : 24.4
	II 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	1 : 48.2
	I 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	2 : 10.51
Off-road Gear Range	II 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	1 : 6.59
	III 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	1 : 4.23
	II 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	1 : 8.66
	I 22 - 32 23 = 1 : 34.5 15 - 27 16 = 1 : 9.7	24 = 1 : 2.145 25 = 1 : 2.145	21 = 1 : 1.91 22 = 1 : 1.91	1 : 8.66

## Running Gear

Roadwheels	Spoked wheels with rubber tires
Inner roadwheels	Removable wheel disks with rubber tires
Outer roadwheels	Spoked wheels with rubber tires
Idler wheels	Spoked wheels with rubber tires
Caterpillar Track:	
Designation	Type "Zpw 51/170/120"
Width	170 mm
Spacing	120 mm
Number of links	40
Length of one track	4.8 mm
Length of track in contact with ground	approx. 820 mm
Rubber blocks	Type "W 02"
Front Wheel	
Tire size	3.5 - 19 Kr 4611
Air pressure	1.7 atm

## Capacities

Fuel:	Capacity of fuel tanks each 21 l = 42 liters
Motor oil:	Engine capacity (oil sump) = 3.2 liters
Level of oil in air filter	= to oil level mark
Transmission oil:	capacity of gear transmission = 1.2 liters
	capacity of steering mechanism = 1 liter
	capacity of air compressor = 0.075 liter
Transmission oil/standard grease mixture:	
capacity of reduction drives	= each 0.225
liter transmission oil	= each 0.225 liter standard grease
Water:	capacity of entire cooling system = 14 liters
Brake fluid:	capacity of hydraulic shock absorber = 0.115 liter





Members of the Luftwaffe with Kettenkrad. A good view of the standard wartime running lights (forward) and rear-view mirror.





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Today this Kettenkrad resides at the  
Bundeswehr barracks in Hohenfels, Germany.